CLAIMS

1. A boundary acoustic wave device using boundary acoustic waves propagating along the interface between a first medium layer and a second medium layer, the boundary acoustic wave device comprising:

the first medium layer;

the second medium layer stacked on the first medium layer;

an electrode disposed in the interface between the first medium layer and the second medium layer; and

a sound-absorbing layer for attenuating modes producing spurious responses, disposed on one or both of the surfaces of the first and second medium layers opposite the interface.

2. The boundary acoustic wave device according to Claim 1, wherein the acoustic velocity of the transverse waves in the sound-absorbing layer is lower than the acoustic velocity of the transverse waves in the first medium layer and/or second medium layer that has the sound-absorbing layer.

3. The boundary acoustic wave device according to Claim 1, wherein the acoustic velocity of the longitudinal waves in the sound-absorbing layer is lower than the acoustic velocity of the longitudinal waves in the first medium layer and/or second medium layer that has the sound-absorbing layer.

4. The boundary acoustic wave device according to Claim 1, wherein the acoustic velocity of the transverse waves in the sound-absorbing layer is in the range of 0.13 to 1.23 times the acoustic velocity of the transverse waves in the first medium layer and/or second medium layer that has the sound-absorbing layer.

5. The boundary acoustic wave device according to any one of Claims 1 to 4, wherein the acoustic impedance of the sound-absorbing layer is in the range of 0.20 to 5.30 times the acoustic impedance of the first medium layer and/or second medium layer that has the sound-absorbing layer.

6. The boundary acoustic wave device according to any one of Claims 1 to 5, wherein the sound-absorbing layer comprises the same type of material as the first medium layer and/or the second medium layer.

7. The boundary acoustic wave device according to any one of Claims 1 to 6, further comprising a low attenuation constant layer outside the sound-absorbing layer, the attenuation constant layer having a lower attenuation constant for acoustic waves than the sound-absorbing layer.

8. The boundary acoustic wave device according to any one of Claims 1 to 7, wherein the sound-absorbing layer comprises at least one material selected from the group consisting of resin, glass, ceramic, and metal.

9. The boundary acoustic wave device according to any one of Claims 1 to 7, wherein the sound-absorbing layer comprises a resin containing a filler.

10. The boundary acoustic wave device according to any one of Claims 1 to 9, wherein the sound-absorbing layer is disposed on the surface of the first medium layer and/or the second medium layer so as to oppose a boundary acoustic wave propagation path in the interface.

11. The boundary acoustic wave device according to any one of Claims 1 to 10, further comprising an electrically conductive layer on at least one surface of the sound-absorbing layer.

12. The boundary acoustic wave device according to any one of Claims 1 to 11, further comprising a through-hole electrode passing through the first medium layer and/or the second medium layer, the through-hole electrode being electrically connected to the electrode disposed at the interface; and an external electrode disposed on an external surface of the boundary acoustic wave device, the external electrode being connected to the through-hole electrode.

13. The boundary acoustic wave device according to Claim 12, wherein the through-hole electrode is filled with an elastic material.

14. The boundary acoustic wave device according to Claim 12 or 13, wherein the through-hole electrode is provided in the first medium layer and the second medium layer separately, and the through-hole electrode of the first medium layer and the through-hole electrode of the second medium layer are formed in a discontinuous manner.

15. The boundary acoustic wave device according to any one of Claims 1 to 14, further compositing a wiring electrode provided on an external surface of the boundary acoustic wave device, the wiring electrode being electrically connected to the electrode disposed at the interface.

16. The boundary acoustic wave device according to Claim 15, further compositing a connection electrode connected to the electrode disposed at the interface, wherein the boundary acoustic wave device has steps on a side surface intersecting the interface and the connection electrode is drawn to the steps, and wherein the wiring electrode is extended to the steps and connected to the connection electrode at the steps.

17. The boundary acoustic wave device according to any one of Claims 1 to 16, further comprising a third material layer in at least one of regions between the first medium layer and the second medium layer, on the outer surface of the first medium layer, and on the outer surface of the second medium layer, the third material layer having a lower linear expansion coefficient in the direction parallel to the interface than the first and the second medium layer.

18. The boundary acoustic wave device according to any one of Claims 1 to 16, further comprising a third material layer in at least one of regions between the first medium layer and the second medium layer, on the outer surface of the first medium layer, and on

the outer surface of the second medium layer, the third material layer having a linear expansion coefficient in the direction parallel to the interface, with the opposite sign to that of the first and the second medium layer.

19. The boundary acoustic wave device according to any one of Claims 1 to 16, further comprising a fourth material layer in at least one of regions between the first medium layer and the second medium layer, on the outer surface of the first medium layer, and on the outer surface of the second medium layer, the fourth material layer having a higher thermal conductivity than the first and the second medium layer.

20. The boundary acoustic wave device according to any one of Claims 1 to 19, further comprising an impedance matching circuit in the interface or on the outer surface of the first or the second medium layer.

21. The boundary acoustic wave device according to any one of Claims 1 to 20, wherein the second medium layer has a thickness of 0.5λ or more and the sound-absorbing layer has a thickness of 1.0λ or more.

22. The boundary acoustic wave device according to any one of Claims 1 to 21, wherein the sound-absorbing layer has a multilayer structure.

23. The boundary acoustic wave device according to Claim 22, wherein the multilayer structure of the sound-absorbing layer includes a plurality of sound-absorbing material layers, and a sound-absorbing material layer close to the second medium layer has an acoustic characteristic impedance between the acoustic impedances of the second medium layer and a sound-absorbing material layer farther from the second medium layer.

24. The boundary acoustic wave device according to any one of Claims 1 to 23, further comprising a mounting board bonded to a

mounting surface with a bump, made of a material harder than the structure including the first and second medium layers and the sound-absorbing layer, wherein the boundary acoustic wave device is mounted using the mounting board.

25. The boundary acoustic wave device according to any one of Claims 1 to 23, further comprising a stress absorber on a surface of the mounting side.

26. A method for manufacturing a boundary acoustic wave device, comprising the steps of:

forming an electrode on a first medium layer;

forming a second medium layer so as to cover the electrode; and

forming a sound-absorbing layer on one or both of the surfaces of the first medium layer and/or the second medium layer opposite the interface therebetween.

27. The method for manufacturing a boundary acoustic wave device according to Claim 26, wherein the step of forming the sound-absorbing layer includes the sub step of removing the gas contained in the sound-absorbing layer.

28. The method for manufacturing a boundary acoustic wave device according to Claim 26 or 27, wherein the method is performed in a mother state in which a plurality of boundary acoustic wave devices are continuously connected and the mother state is divided into boundary acoustic wave devices after the sound-absorbing layer is formed.

29. The method for manufacturing a boundary acoustic wave device according to Claim 26 or 27, wherein the steps before the step of forming the sound-absorbing layer are performed in a mother state, and the step of forming the sound-absorbing layer is performed after the mother state is divided into boundary acoustic wave devices.